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Relevance scale ☐ ☐ ☐ ☐ ☐1 [A procedural approach to authoring solid models](#)
 Barbara Cutler, Julie Dorsey, Leonard McMillan, Matthias Müller, Robert Jagnow
 July 2002 **ACM Transactions on Graphics (TOG), Proceedings of the 29th annual conference on Computer graphics and interactive techniques**, Volume 21 Issue 3

Full text available: pdf(11.99 MB)

 Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

We present a procedural approach to authoring layered, solid models. Using a simple scripting language, we define the internal structure of a volume from one or more input meshes. Sculpting and simulation operators are applied within the context of the language to shape and modify the model. Our framework treats simulation as a modeling operator rather than simply as a tool for animation, thereby suggesting a new paradigm for modeling as well as a new level of abstraction for interacting with si ...

Keywords: signed-distance function, tetrahedral representation, volumetric modeling
2 [A framework for geometric warps and deformations](#)
 Tim Milliron, Robert J. Jensen, Ronen Barzel, Adam Finkelstein
 January 2002 **ACM Transactions on Graphics (TOG)**, Volume 21 Issue 1

Full text available: pdf(3.20 MB)

 Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

We present a framework for geometric warps and deformations. The framework provides a conceptual and mathematical foundation for analyzing known warps and for developing new warps, and serves as a common base for many warps and deformations. Our framework is composed of two components: a generic modular algorithm for warps and deformations; and a concise, geometrically meaningful formula that describes how warps are evaluated. Together, these two elements comprise a complete framework useful for ...

Keywords: Deformation, warp
3 [Session 3: 3D virtual clothing: from garment design to web3d visualization and simulation](#)
 Luca Chittaro, Demis Corvaglia
 March 2003 **Proceeding of the eighth international conference on 3D Web technology**

Full text available:  [pdf\(3.06 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

One of the major challenges in Computer Graphics concerns the 3D representation and physically-based simulation of garments. In our research, we are working closely with the textile industry, investigating three different classes of problems. First, we aim at developing techniques and methods for cloth simulation specifically aimed at the Web3D context. Second, we are defining a cross-application data exchange format among the different CAD systems and applications used in the textile industry, ...

Keywords: CAD tools for garment design, VRML/Java, XML, cross-application data exchange format for the textile industry, physically-based simulation, product visualization, virtual clothing

4 [Session P1: medical visualization: Integration of measurement tools in medical 3d visualizations](#)

Bernhard Preim, Christian Tietjen, Wolf Spindler, Heinz Otto Peitgen
October 2002 **Proceedings of the conference on Visualization '02**

Full text available:  [pdf\(7.88 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

We discuss 3d interaction techniques for the quantitative analysis of spatial relations in medical visualizations. We describe the design and implementation of measurement tools to measure distances, angles and volumes in 3d visualizations. The visualization of measurement tools as recognizable 3d objects and a 3d interaction, which is both intuitive and precise, determines the usability of such facilities. Measurements may be carried out in 2d visualizations of the original radiological data an ...

Keywords: computer-assisted surgery, interaction techniques, medical visualization, quantitative analysis

5 [Session C6: virtual reality: Virtual temporal bone dissection: a case study](#)

Jason Bryan, Don Stredney, Greg Wiet, Dennis Sessanna
October 2001 **Proceedings of the conference on Visualization '01**

Full text available:  [pdf\(1.27 MB\)](#)  Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)
[Publisher Site](#)

The Temporal Bone Dissection Simulator is an ongoing research project for the construction of a synthetic environment suitable for virtual dissection of human temporal bone and related anatomy. Funded by the National Institute on Deafness and Other Communication Disorders (NIDCD), the primary goal of this project is to provide a safe, robust, and cost-effective virtual environment for learning the anatomy and surgical procedures associated with the temporal bone. Direct volume visualization has ...

Keywords: temporal bone dissection

6 [Pop-up light field: An interactive image-based modeling and rendering system](#)

Heung-Yeung Shum, Jian Sun, Shuntaro Yamazaki, Yin Li, Chi-Keung Tang
April 2004 **ACM Transactions on Graphics (TOG)**, Volume 23 Issue 2

Full text available:  [pdf\(981.86 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

In this article, we present an image-based modeling and rendering system, which we call *pop-up light field*, that models a sparse light field using a set of *coherent layers*. In our system, the user specifies how many coherent layers should be modeled or popped up according to the scene complexity. A coherent layer is defined as a collection of


corresponding planar regions in the light field images. A coherent layer can be rendered free of aliasing all by itself, or against other bac ...

Keywords: Image-based rendering, interactive techniques, layers, light field, lumigraph, matting

7 Anatomically based modeling

Jane Wilhelms, Allen Van Gelder

August 1997 **Proceedings of the 24th annual conference on Computer graphics and interactive techniques**

Full text available:  pdf(2.61 MB)

Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

Keywords: anatomically-based modeling, human and animal modeling

8 Session P3: volume visualization I: Interactive translucent volume rendering and procedural modeling

Joe Kniss, Simon Premoze, Charles Hansen, David Ebert

October 2002 **Proceedings of the conference on Visualization '02**

Full text available:  pdf(37.78 MB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Direct volume rendering is a commonly used technique in visualization applications. Many of these applications require sophisticated shading models to capture subtle lighting effects and characteristics of volumetric data and materials. Many common objects and natural phenomena exhibit visual quality that cannot be captured using simple lighting models or cannot be solved at interactive rates using more sophisticated methods. We present a simple yet effective interactive shading model which capt ...

Keywords: procedural modeling, shading model, volume modeling, volume rendering

9 Rendering: Hardware accelerated rendering of foliage for real-time applications

Gábor Szijártó, József Koloszá

April 2003 **Proceedings of the 19th spring conference on Computer graphics**

Full text available:  pdf(305.08 KB)

Additional Information: [full citation](#), [abstract](#), [references](#)

One of the major challenges in developing techniques for realistic and high performance visualization of outdoor environments is rendering of vegetation. The greatest problem is that convincing modeling of trees, bushes and undergrowth requires very large numbers of polygons that exceed the limits posed by rendering hardware today (and in the near future). A number of methods have been proposed in the past to address the issue, most of which are variants of multi-resolution modeling and level-of ...

Keywords: outdoor simulation, tree rendering, view dependent visualization

10 Level set surface editing operators

Ken Museth, David E. Breen, Ross T. Whitaker, Alan H. Barr

July 2002 **ACM Transactions on Graphics (TOG) , Proceedings of the 29th annual conference on Computer graphics and interactive techniques**, Volume 21 Issue 3

Full text available:  pdf(11.19 MB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)


We present a level set framework for implementing editing operators for surfaces. Level set models are deformable implicit surfaces where the deformation of the surface is controlled by a speed function in the level set partial differential equation. In this paper we define a collection of speed functions that produce a set of surface editing operators. The speed functions describe the velocity at each point on the evolving surface in the direction of the surface normal. All of the information n ...

Keywords: deformations, geometric modeling, implicit surfaces, shape blending

11 Multi-resolution multi-field ray tracing: a mathematical overview

C. Gasparakis

October 1999 **Proceedings of the conference on Visualization '99: celebrating ten years**

Full text available:  [pdf\(211.49 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

A rigorous mathematical review of ray tracing is presented. The concept of a generic voxel decoder acting on flexible voxel formats is introduced. The necessity of interpolating opacity weighted colors is proved, using a new definition of the blending process in terms of functional integrals. The continuum limit of the discrete opacity accumulation formula is presented, and its convexity properties are investigated. The issues pertaining to interpolation/classification order are discussed. ...

12 The ULTRAVIS system

Gunter Knittel

October 2000 **Proceedings of the 2000 IEEE symposium on Volume visualization**

Full text available:  [pdf\(428.76 KB\)](#) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

Keywords: raycasting, volume rendering

13 System section: A novel technique for indexing video surveillance data

Eamonn Keogh, Bhrigu Celly, Chotirat Ann Ratanamahatana, Victor Zordan

November 2003 **First ACM SIGMM international workshop on Video surveillance**

Full text available:  [pdf\(961.84 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Recent worldwide events have renewed interest in the use of video surveillance as a tool for private security, law enforcement and military applications. After appropriate feature extraction has taken place, most video surveillance problems are reduced to the problem of efficiently and robustly matching motion streams. Since all natural motion typically has some variability in the time axis, Dynamic Time Warping (DTW), a technique that aligns the motion streams before calculating their similarity ...

Keywords: indexing, lower bounding, surveillance data, uniform scaling

14 An anti-aliasing technique for splatting

J. Edward Swan, Klaus Mueller, Torsten Möller, Naeem Shareef, Roger Crawfis, Roni Yagel

October 1997 **Proceedings of the 8th conference on Visualization '97**

Full text available:  [pdf\(1.22 MB\)](#)  [Publisher Site](#) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

Keywords: anti-aliasing, direct volume rendering resampling, perspective projection, reconstruction, splattering, volume rendering

15 Session P14: biomedical applications: Volume rendering of fine details within medical data

Feng Dong, Gordon J. Clapworthy, Mel Krokos

October 2001 **Proceedings of the conference on Visualization '01**

Full text available:  pdf(510.04 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

 [Publisher Site](#)

This paper presents a method concerning the volume rendering of fine details, such as blood vessels and nerves, from medical data. The realistic and efficient visualization of such structures is often of great medical interest, and conventional rendering techniques do not always deal with them adequately. Our method uses preprocessing to reconstruct fine details that are difficult to segment and label. It detects the presence of fine geometrical structures, such as cracks or cylinders that suggest ...

Keywords: fine details, image processing, medical visualization, volume rendering, volume textures

16 Perceptually based brush strokes for nonphotorealistic visualization

Christopher G. Healey, Laura Tateosian, James T. Enns, Mark Remple

January 2004 **ACM Transactions on Graphics (TOG)**, Volume 23 Issue 1

Full text available:  pdf(479.81 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

An important problem in the area of computer graphics is the visualization of large, complex information spaces. Datasets of this type have grown rapidly in recent years, both in number and in size. Images of the data stored in these collections must support rapid and accurate exploration and analysis. This article presents a method for constructing visualizations that are both effective and aesthetic. Our approach uses techniques from master paintings and human perception to visualize a multidimensional ...

Keywords: Abstractionism, Impressionism, color, computer graphics, human vision, nonphotorealistic rendering, perception, psychophysics, scientific visualization, texture

17 Session G: Image-based techniques in computer graphics: Real time isosurface browsing

Caleb Lyness, Edwin Blake

November 2001 **Proceedings of the 1st international conference on Computer graphics, virtual reality and visualisation**

Full text available:  pdf(386.92 KB)


Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

As volumetric datasets get larger, exploring the data sets becomes more difficult and tedious. Two approaches have previously been used to solve this problem: presentation of an abstraction of the data and acceleration of extraction and rendering of the data. We present a user centered approach which decouples the volume visualisation into two modes. Selection of the mode is done based on the user's actions. The first mode uses traditional isosurface rendering and extraction techniques and is applied ...

Keywords: User centered approach, decoupling, isosurface browsing, volumetric data exploration

18 Fast sliding thin slab volume visualization

Shin Yi Yen, Sandy Napel, Geoffrey D. Rubin

October 1996 **Proceedings of the 1996 symposium on Volume visualization**Full text available:  pdf(2.44 MB)Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)**19 Smoke simulation for large scale phenomena**

Nick Rasmussen, Duc Quang Nguyen, Willi Geiger, Ronald Fedkiw


July 2003 **ACM Transactions on Graphics (TOG)**, Volume 22 Issue 3Full text available:  pdf(687.57 KB)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

In this paper, we present an efficient method for simulating highly detailed large scale participating media such as the nuclear explosions shown in figure 1. We capture this phenomena by simulating the motion of particles in a fluid dynamics generated velocity field. A novel aspect of this paper is the creation of highly detailed three-dimensional turbulent velocity fields at interactive rates using a low to moderate amount of memory. The key idea is the combination of two-dimensional high reso ...

Keywords: Kolmogorov spectrum, incompressible Navier-Stokes equations, smoke, wind fields

20 Topological considerations in isosurface generation

Allen van Gelder, Jane Wilhelms

October 1994 **ACM Transactions on Graphics (TOG)**, Volume 13 Issue 4Full text available:  pdf(4.25 MB)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

A popular technique for rendition of isosurfaces in sampled data is to consider cells with sample points as corners and approximate the isosurface in each cell by one or more polygons whose vertices are obtained by interpolation of the sample data. That is, each polygon vertex is a point on a cell edge, between two adjacent sample points, where the function is estimated to equal the desired threshold value. The two sample points have values on opposite sides of the threshold, and the interp ...

Keywords: ambiguity, isosurface extraction, scientific visualization, surface fitting, surface topology

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